

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



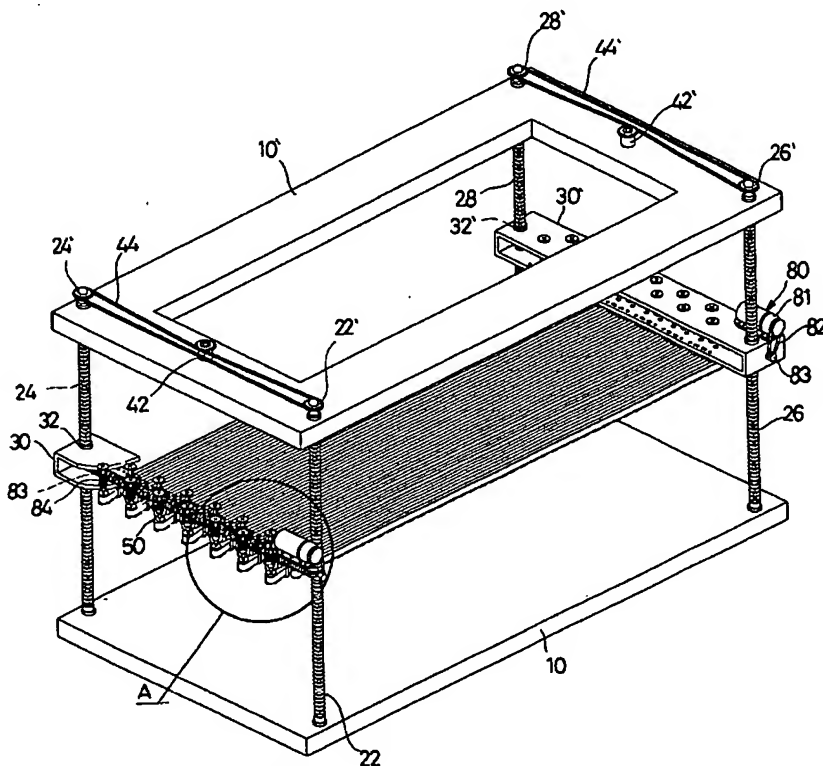
(43) International Publication Date  
29 January 2004 (29.01.2004)

PCT

(10) International Publication Number  
**WO 2004/009310 A1**

- (51) International Patent Classification<sup>7</sup>: **B28D 1/02** (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BG, BR, BY, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, ES, FI, GB, HU, ID, IL, IN, IS, JP, KE, LK, LT, LU, MA, MK, MN, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SD, SE, SG, TR, TZ, UA, UG, US, UZ, VN, ZA, ZM, ZW.
- (21) International Application Number: PCT/KR2003/001440
- (22) International Filing Date: 21 July 2003 (21.07.2003)
- (25) Filing Language: Korean (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- (26) Publication Language: English
- (30) Priority Data: 10-2002-0043137 23 July 2002 (23.07.2002) KR
- (71) Applicant and  
(72) Inventor: **CHOI, Kuei Tai** [KR/KR]; 530-37 Masan-ri, Yeonmu-eup, Nonsan-si, Chungcheongnam-do 320-834 (KR).
- (74) Agent: **YOU, Byung Sun**; 610 Mannyun-Officetel, 241 Walpyung-dong, Seo-gu, Daejeon 302-282 (KR).
- Published:  
— with international search report
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: A STONE SLICER



rotating the driving pulleys (50).

(57) Abstract: A stone slicer of slicing rough stone into stone plates having a predetermined thickness, which can improve productivity by reducing consumption of the rough stone by minimizing the thickness of a cut portion cut by a saw blade, and can reduce the treatment cost of sludge generated when the stone is sliced and prevent pollution due to the generated sludge. The stone slicer includes a base (10) on which stone is placed, four columns (22, 24, 26, 28) vertically installed at four edges of the base (10), a pair of a pair of platforms (30, 30') installed left and right so as to be capable of simultaneously elevating along either side of the columns (22, 24, 26, 28), platform driving means (40, 40') for elevating the platforms (30, 30'), one or more endless track type belt saws (70) each having opposite ends mounted in parallel with driving pulleys (50) and driven pulleys (60) provided at the platforms (30, 30'), and belt saw driving means (80) for driving the belt saws (70) to slice the stone placed on the base (10) to a predetermined thickness while rotating along an endless track by

Rec'd PCT/PTC 11 JAN 2005

A STONE SLICERTechnical Field

The present invention relates to a stone slicer, and more particularly,  
5 to a stone slicer in which a plurality of belt saws circulating along an endless  
track are installed between opposite platforms in parallel with one another,  
and stone placed on a base is sliced to a predetermined thickness while the  
belt saws circulate as the platforms fall down. Consumption of stone and  
10 generation of sludge can be reduced compared to a conventional circular  
shank type slicer.

Background Art

In a conventional stone slicer, a circular shank for slicing stone thinly  
or to a predetermined thickness has been employed. The conventional  
15 circular shank has a thickness of 5 to 6 mm, and 8 to 8.5 mm thick diamond  
tips must be overcoated thereon to allow slicing. The amount of stone  
consumed is approximately 30% of rough stone. Thus, since the slicing  
cost becomes high and a considerable cost is also required in treating stone  
sludge produced during slicing. Hence, the stone slicing work is  
20 burdensome and has low efficiency.

### Disclosure of the Invention

To solve the problems of the conventional circular shank type stone slicer, it is an object of the present invention to provide a stone slicer of slicing rough stone into stone plates having a predetermined thickness, which can improve productivity by reducing consumption of the rough stone by minimizing the thickness of a cut portion cut by a saw blade, and can reduce the treatment cost of sludge generated when the stone is sliced and prevent pollution due to the generated sludge.

To achieve the object of the present invention, there is provided a stone slicer comprising a base on which rough stone is placed, four columns vertically installed at four edges of the base, a pair of platforms elevatably installed at the columns left and right, platform driving means for driving the platforms to elevate, one or more endless track type belt saws each having opposite ends mounted in parallel with driving pulleys and driven pulleys provided at either side of the platforms, and belt saw driving means for driving the rough stone placed on the base to be sliced to a predetermined thickness while the belt saws rotate endlessly by rotating the driving pulleys.

The belt saws are formed of a thin metal plate and have strong slicing tips installed on the bottom of the belt saws at a constant interval. The stone is sliced during rotation of the belt saws mounted between the driving pulleys and the driven pulleys.

The driving pulleys provided at the platforms are driven by a power

transmission mechanism in which the same driving power is transmitted from one driving means to the driving pulleys.

#### Brief Description of the Drawings

5        FIG. 1 is a perspective view of a stone slicer according to the present invention;

FIG. 2 is a plan view of the stone slicer according to the present invention;

10       FIG. 3 is a front view of the stone slicer according to the present invention;

FIG. 4 is a side view of the stone slicer according to the present invention;

FIG. 5 is an enlarged perspective view of a portion "A" shown in FIG. 1, showing a belt saw driving means according to the present invention;

15       FIG. 6 is an enlarged perspective view of a belt saw of the stone slicer according to the present invention; and

FIG. 7 is an operation state diagram of the stone slicer according to the present invention.

20       Best mode for carrying out the Invention

For the purposes of promoting an understanding of the present invention, reference will be now be made to the embodiments illustrated in the accompanying drawings.

FIG. 1 is a perspective view of a stone slicer according to the present invention, FIG. 2 is a plan view of the stone slicer according to the present invention, FIG. 3 is a front view of the stone slicer according to the present invention, and FIG. 4 is a side view of the stone slicer according to the present invention.

As shown in FIGS. 1 through 4, the stone slicer according to the present invention includes a base 10 on which stone (not shown) is placed, four columns 22, 24, 26, 28 vertically installed at four edges of the base 10 and having upper ends rotatably fixed on edges of an upper plate 10', a pair of platforms 30, 30' installed left and right so as to be capable of simultaneously elevating along either side of the columns (22, 24), (26, 28), platform driving means 40, 40' for elevating the platforms 30, 30', one or more endless track type belt saws 70 each having opposite ends mounted in parallel with driving pulleys 50 and driven pulleys 60 provided at the platforms 30, 30', and belt saw driving means 80 for driving the belt saws 70 to slice the stone placed on the base 10 to a predetermined thickness while rotating along an endless track by rotating the driving pulleys 50.

The base 10 is fabricated using a strong, durable material so as to withstand the weight of large-sized stone to be placed thereon and sliced. Also, the base 10 must be installed on solid, horizontal ground for vertically cutting the stone. Front and rear sides of the base 10 are opened so as to

allow the rough stone to be transported easily to be seated on the base 10 and to allow a stone plate sliced by the belt saws 70 to be transported easily.

Also, the base 10 may be fabricated in a left-right-separation type, so  
5 that separate base parts can be installed at opposite sides of solid and horizontal ground, respectively.

The columns 22, 24, 26, 28 are vertically installed in parallel with each other so that they can fully withstand the weight of the upper plate 10' and the platforms 30, 30' while guiding elevating operations of the platforms 30  
10 and 30'. The platforms 30 and 30' are of a screw type, and the columns 22, 24, 26, 28 penetrate the platforms 30, 30'. Female-screw type guide bearings 32, 32' for guiding vertical elevation of the platforms 30, 30' are installed. The platforms 30, 30' are operable to elevate while the columns 22, 24, 26, 28 are rotated by the driving means 40, 40'.

15 The platforms 30, 30' are substantially box-shaped, and have driving means 80 for driving the belt saws 70 installed therein. As shown in FIG. 5, the driving means 80 installed in the platform 30 includes a driving motor 81 operable by electricity, oil pressure or air pressure, a helical gear 83 connected to the driving motor 81 and a power transmission means 82 such  
20 as a belt or a chain to be driven and horizontally elongated in the front and rear directions of the platform 30, vertical gears 84 spaced apart a predetermined interval in the left and right of the helical gear 83 to be geared, and driving pulleys 50 axially-connected to the vertical gears 84. Each of the belt saws 70 is connected between the driving pulley 50 and the

driven pulley 60 installed at the platform 30' to face the driving pulley 50, and the belt saws 70 each rotates along an endless track. The driving pulleys 50 and the driven pulleys 60 have a large diameter for securing stable rotation of the belt saws 70, thereby maintaining the belt saws 70 at a constant interval. Also, in order to impart tension to the belt saws 70, each pair of auxiliary pulleys 85, 86 are installed in the driving pulleys 50 and the driven pulleys 60, thereby adjusting the interval between the belt saws 70.

The driving means 40, 40' for elevating the platforms 30, 30' include driving motors 42, 42' installed at either side of the upper plate 10', sprockets 22', 24', 26', 28' installed at the upper end of the columns 22, 24, 26, 28, and chains 44, 44' installed between the columns 22, 24 and the driving motor 42 and between the columns 26, 28 and the driving motor 42'. As the driving motors 42, 42' of either side are synchronized and rotate forward and backward at a constant speed, the columns 22, 24, 26, 28 rotate and then the platforms 30, 30' threaded with the columns 22, 24, 26, 28 elevate accordingly.

The belt saws 70 are fabricated using a thin metal plate, e.g., carbon steel, as shown in FIG. 6. Strong slicing tips 74 are welded on the bottom of the metal plate 72 at a constant interval to slice stone.

The stone slicer according to the present invention is configured to determine a slicing thickness of stone by designing an interval between the belt saws 70 into a desired dimension. Also, the interval between the platforms 30 and 30' and the height of each column can be determined in various manners so as to be suitable to the size of stone to be sliced.

Thus, the stone slicer according to the present invention can replace the conventional circular shank type stone slicer in stone cutting and processing fields.

As shown in FIG. 6, in the stone slicer according to the present invention, in a state in which the platforms 30 and 30' are raised, stone S is placed on a base 10 and then the platforms 30 and 30' are lowered at the same speed to rotate the belt saws 70 in an endless track manner. Then, the belt saws 70 contact the top surface of the stone S, which is then sliced by means of the slicing tips 74, producing slots. As the platforms 30 and 30' gradually fall down, the belt saws 70 are lowered to slice the stone S. Thus, the stone S is vertically sliced at once in conformity with the interval between the belt saws 70. In the present invention, since the belt saws 70 are only 3 mm in thickness, the amount of stone sliced away and consumed is greatly reduced, increasing productivity by approximately 50% compared to the conventional circular shank type stone slicer.

#### Industrial Applicability

According to the present invention, as platforms are lowered, a plurality of belt saws installed in parallel with each other rotate along an endless track, and slice stone placed on a base at a constant interval. Since several stone plates are simultaneously obtained from rough stone, the manufacturing cost can be reduced. Also, since thin belt saws are used in slicing stone, the thickness of stone sliced and disposed away can



be minimized and sludge generated by slicing can be reduced. Thus, the treatment cost of the sludge can be reduced and secondary environmental pollution can also be prevented.

What is claimed is:

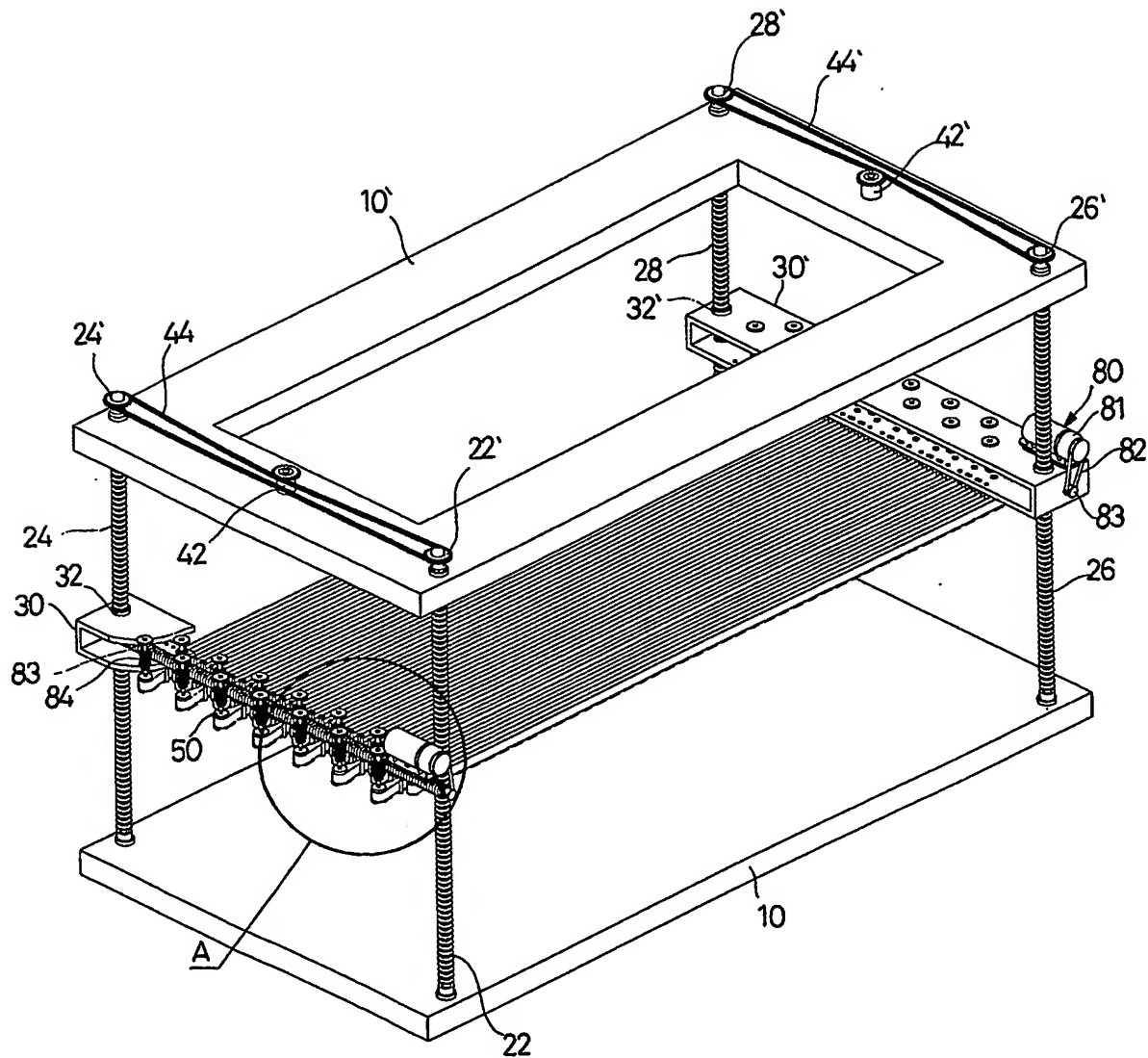
1. A stone slicer comprising:
  - a base (10) on which stone is placed;
  - four columns (22, 24, 26, 28) vertically installed at four edges of the
  - 5 base (10);
  - a pair of platforms (30, 30') installed left and right so as to be capable of simultaneously elevating along either side of the columns (22, 24, 26, 28);
  - platform driving means (40, 40') for elevating the platforms (30, 30');
  - 10 one or more endless track type belt saws (70) each having opposite ends mounted in parallel with driving pulleys (50) and driven pulleys (60) provided at the platforms (30, 30'); and
  - belt saw driving means (80) for driving the belt saws (70) to slice the stone placed on the base (10) to a predetermined thickness while rotating
  - 15 along an endless track by rotating the driving pulleys (50).
2. The stone slicer of claim 1, wherein the belt saw driving means (80) comprises:
  - a driving motor (81);
  - 20 a helical gear (83) connected to the driving motor (81) and a power transmission means (82) including a belt or a chain to be driven and horizontally elongated in the front and rear directions of the platform (30);
  - vertical gears (84) geared into the left and right of the helical gear (83); and
  - 25 driving pulleys (50) axially-connected to the vertical gears (84).

3. The stone slicer of claim 2, wherein each pair of auxiliary pulleys (85, 86) are installed in the driving pulleys (50) and the driven pulleys (60), thereby adjusting an interval between the belt saws 70 and imparting  
5 tension to the belt saws (70).

4. The stone slicer of claim 1, wherein the driving means (40, 40') for elevating the platforms (30, 30') include driving motors (42, 42') installed at either side of the upper plate 10' left and right, sprockets (22', 24', 26', 28')  
10 installed at the upper ends of the columns (22, 24, 26, 28), and chains (44, 44') installed between the columns (22, 24) and the driving motor (42) and between the columns (26, 28) and the driving motor (42'), whereby the columns 22, 24, 26, 28 rotate and then the platforms 30, 30' threaded with the columns 22, 24, 26, 28 elevate accordingly as the driving motors 42, 42'  
15 of either side are synchronized and rotate forward and backward at a constant speed.

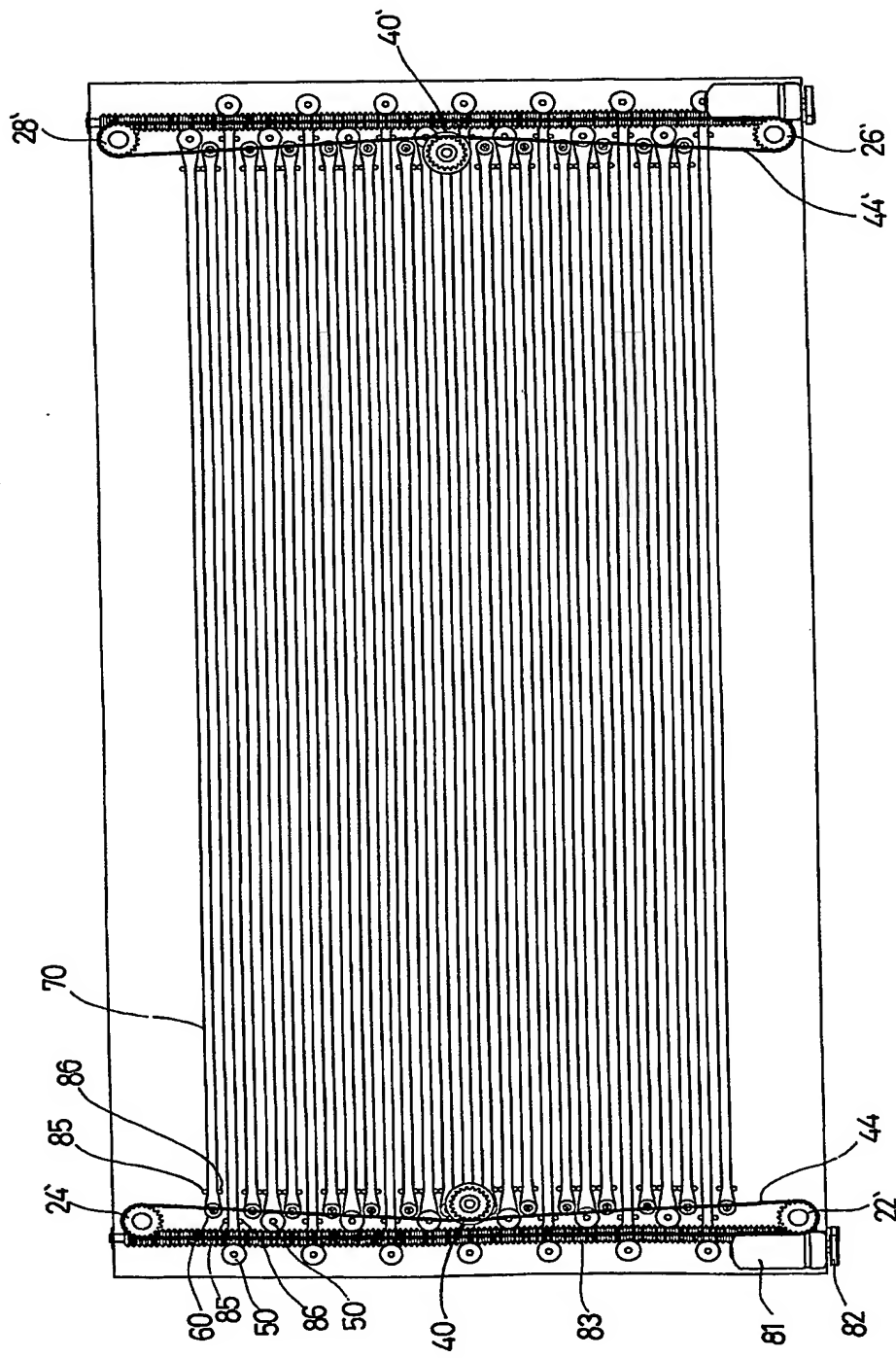
1/7

FIG. 1



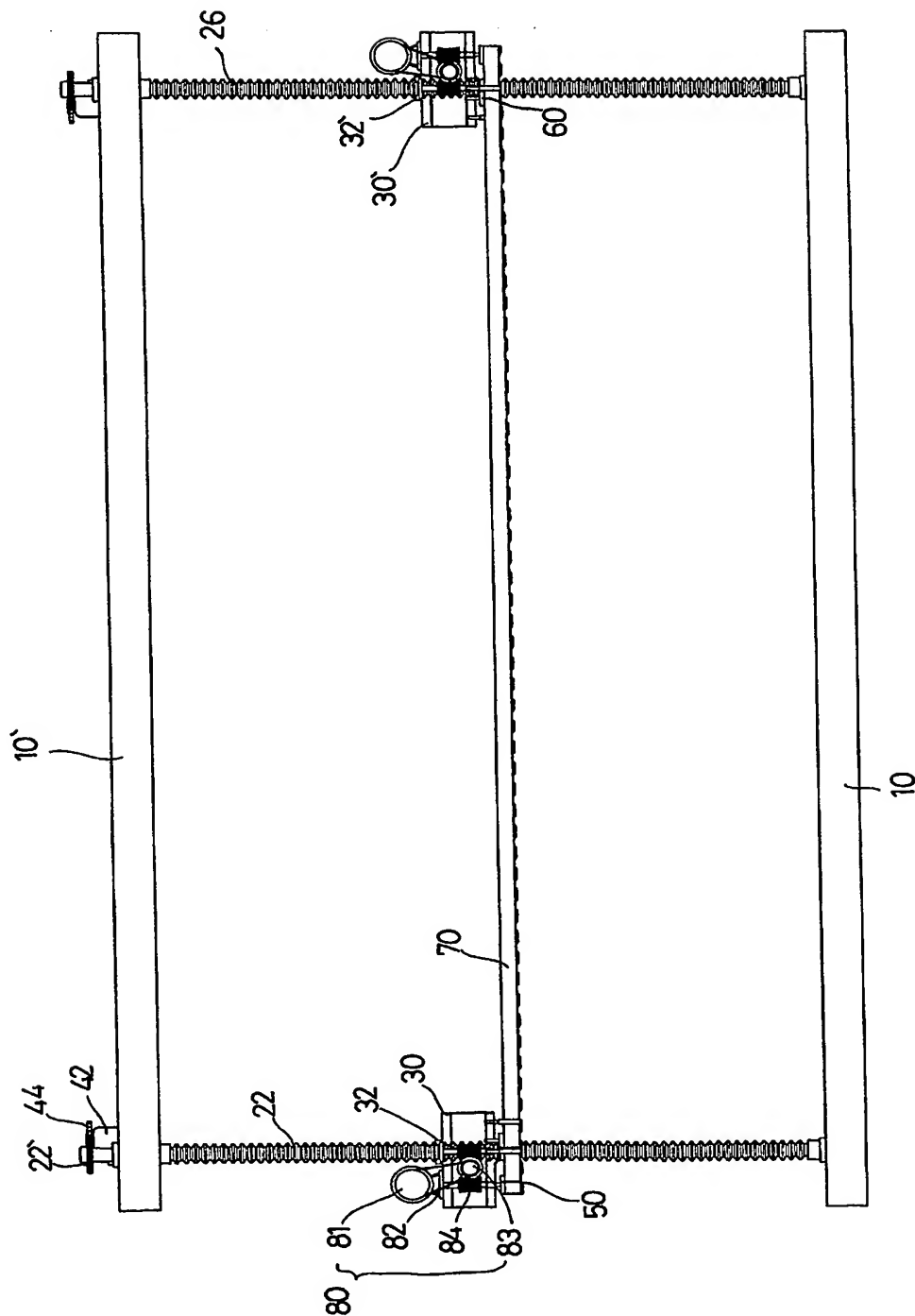
2/7

FIG. 2



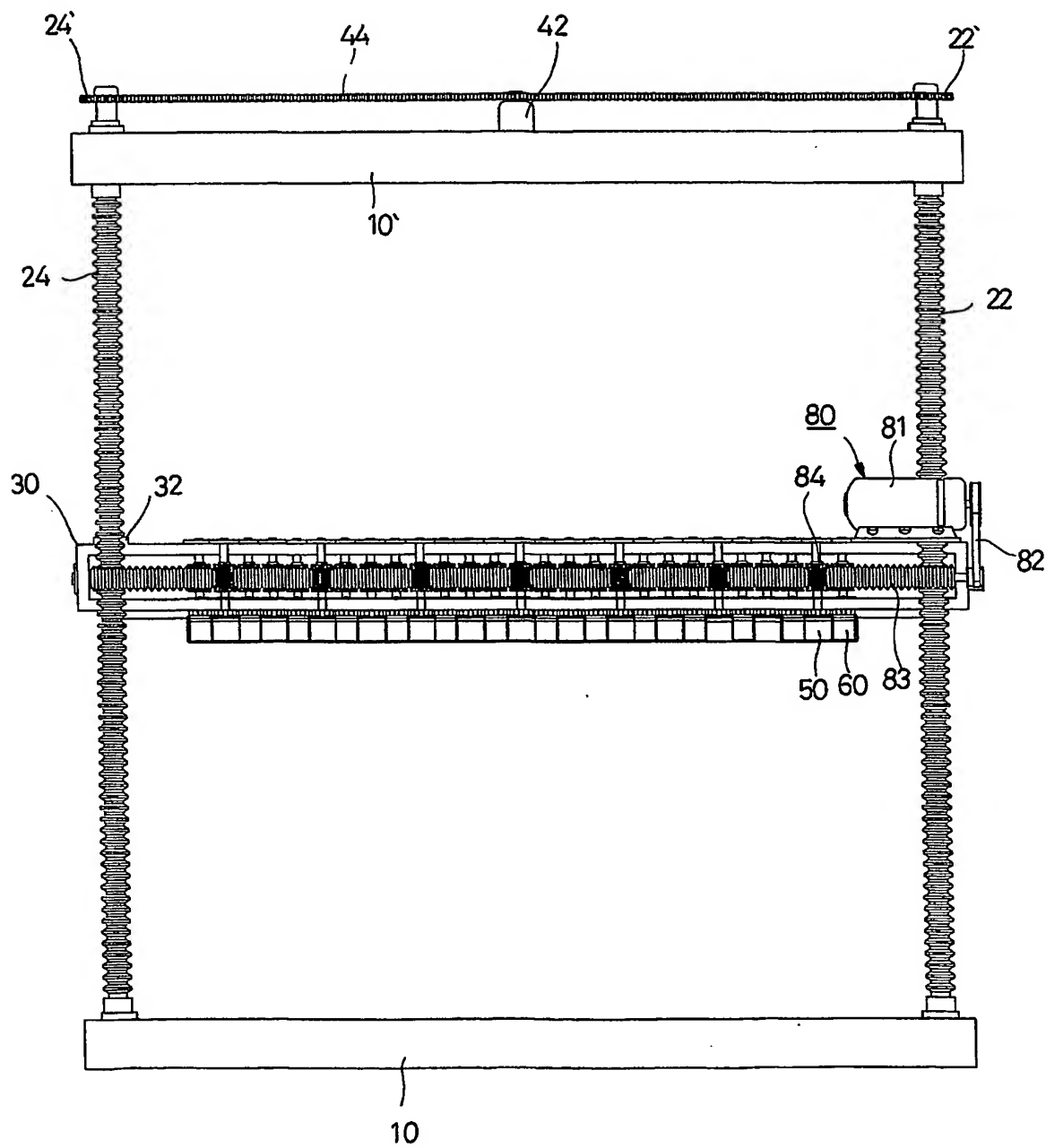
3/7

FIG. 3



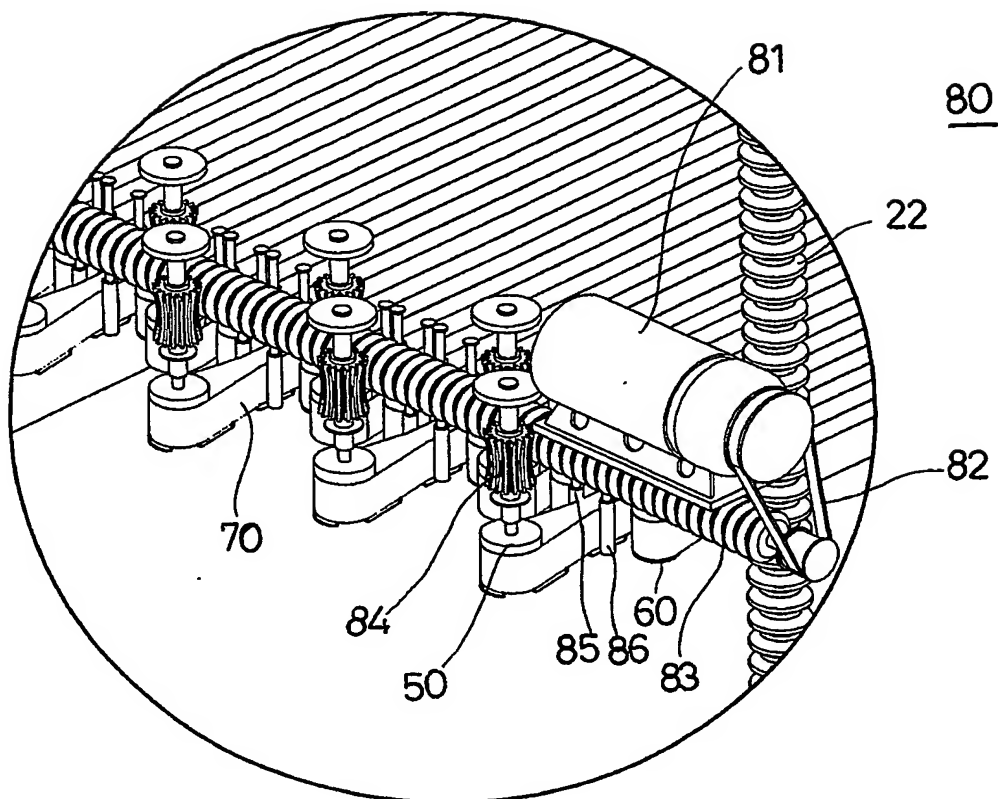
4/7

FIG. 4



5/7

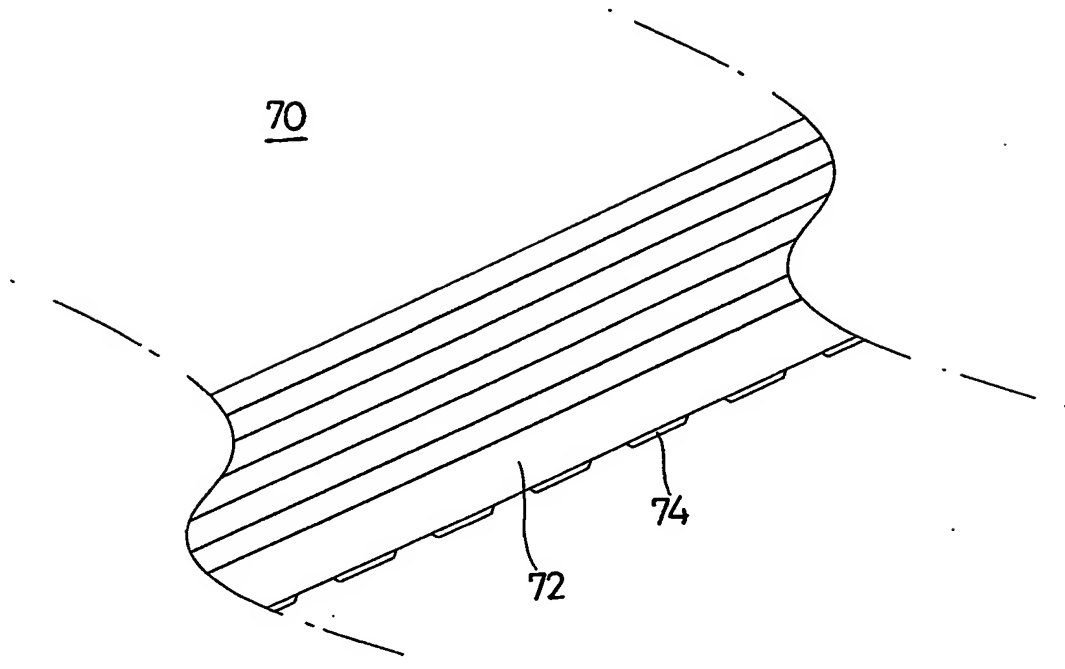
FIG. 5





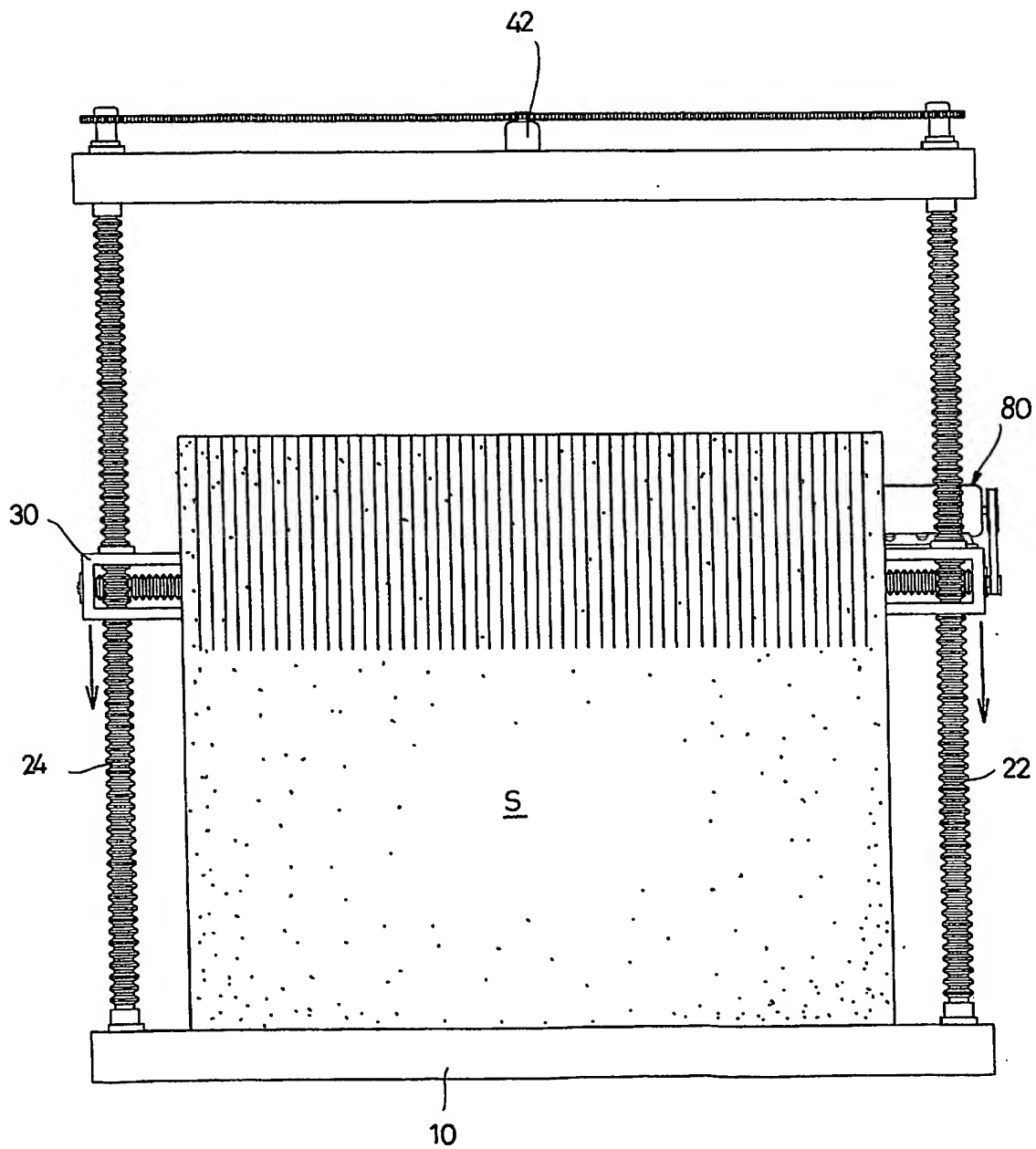
6/7

FIG. 6



7/7

FIG. 7



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/KR03/01440**A. CLASSIFICATION OF SUBJECT MATTER****IPC7 B28D 1/02**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC7 B28D 1/08

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
Korean Patents and applications for inventions since 1975Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
New Patent & Utility search System (KIPO)**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 7-52147 A (ISHIZUKA HIROSHI) 28 FEBRUARY 1995	1-4
A	KR 94-007262 B (KANG CHANG SHIN) 12 AUGUST 1994	1-4

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

27 OCTOBER 2003 (27.10.2003)

Date of mailing of the international search report

28 OCTOBER 2003 (28.10.2003)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office  
920 Dunsan-dong, Seo-gu, Daejeon 302-701,  
Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

LEE, Hak Woang

Telephone No. 82-42-481-5520



**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☒ **FADED TEXT OR DRAWING**
- ☒ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**